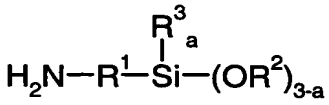
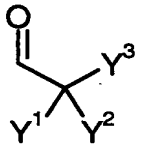
Claims

1. An aldiminoalkylsilane **ALS** prepared from the reaction of at least one aminoalkylsilane **AS** of the formula (I)



(I)

and at least one aldehyde **ALD** of the formula (II)



(II)

where

R^1 is a linear or branched, optionally cyclic, alkylene group having 1 to 20 carbon atoms, optionally with aromatic components, and optionally with one or more heteroatoms, especially nitrogen atoms;

R^2 is an alkyl group having 1 to 5 carbon atoms;

R^3 is an alkyl group having 1 to 8 carbon atoms;

a is 0, 1 or 2, especially 0;

Y^1 and Y^2 either

independently of one another are each an organic radical;

or

together form a carbocyclic or heterocyclic ring which has a size of between 5 and 8, preferably 6, atoms;

and Y^3 either

is a substituted or unsubstituted alkyl group which has at least one heteroatom;

or

is a branched or unbranched alkyl or alkylene group having at least 10 carbon atoms;

or

is a substituted or unsubstituted aryl or arylalkyl group;

or

is $O\text{-}R^4$ or $O\text{-}\overset{O}{\overset{\|}{C}}\text{-}R^4$ or $\overset{O}{\overset{\|}{C}}\text{-}O\text{-}R^4$ or $\overset{O}{\overset{\|}{C}}\text{-}R^4$,

where R^4 is an alkyl, arylalkyl or aryl group having at least 3 carbon atoms and is in each case substituted or unsubstituted.

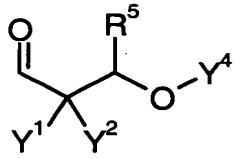
2. The aldiminoalkylsilane **ALS** of claim 1, characterized in that R^1 is a methylene, propylene, methylpropylene, butylene or dimethylbutylene group, in particular a propylene group.

3. The aldiminoalkylsilane **ALS** of claim 1 or 2, characterized in that R^2 is a methyl group or is an ethyl group or is an isopropyl group, in particular is a methyl group or is an ethyl group.

4. The aldiminoalkylsilane **ALS** of any one of claims 1 – 3, characterized in that R^3 is a methyl group or is an ethyl group, in particular is a methyl group.

5. The aldiminoalkylsilane **ALS** of any one of the preceding claims, characterized in that the aminoalkylsilane **AS** of the formula (I) is 3-aminopropyltrimethoxysilane, 3-aminopropyltriethoxysilane, 4-amino-3,3-dimethylbutyltrimethoxysilane, N-(2-aminoethyl)-3-aminopropyltrimethoxysilane or N-(2-aminoethyl)-3-aminopropyltriethoxysilane, especially 3-aminopropyltrimethoxysilane or 3-aminopropyltriethoxysilane.

6. The aldiminoalkylsilane **ALS** of any one of the preceding claims, characterized in that the aldehyde **ALD** is a compound of the formula (III)



(III)

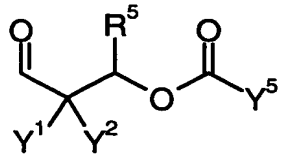
where

R^5 is a hydrogen atom or is an alkyl or arylalkyl or aryl group;

and

Y^4 is an alkyl or arylalkyl or aryl group.

7. The aldiminoalkylsilane **ALS** of any one of claims 1 – 5, characterized in that the aldehyde **ALD** is a compound of the formula (IV)



(IV)

where R^5 is a hydrogen atom or is an alkyl or arylalkyl or aryl group;
and Y^5 either

is a hydrogen atom;

or

is an alkyl or arylalkyl or aryl group which optionally has at least one heteroatom, in particular an ether oxygen, optionally contains at least one carboxyl group and optionally contains at least one ester group;

or

is a mono- or polyunsaturated, linear or branched hydrocarbon chain.

8. The aldiminoalkylsilane **ALS** of claim 7, characterized in that R^5 is a hydrogen atom; and in that
Y^5 either

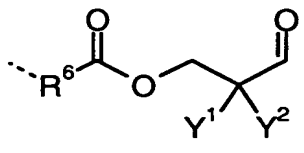
is a linear or branched alkyl chain having 11 to 30 carbon atoms, optionally having at least one heteroatom, in particular having at least one ether oxygen;

or

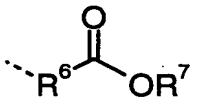
is a mono- or polyunsaturated, linear or branched hydrocarbon chain having 11 to 30 carbon atoms;

or

is a radical of the formula (V) or (VI)



(V)



(VI)

where

R^6 either

is a linear or branched or cyclic alkylene chain having 2 to 16 carbon atoms, optionally having at least one heteroatom, in particular having at least one ether oxygen;

or

is a mono- or polyunsaturated, linear or branched or cyclic hydrocarbon chain having 2 to 16 carbon atoms;

and

R^7 is a linear or branched alkyl chain having 1 to 8 carbon atoms.

9. The aldiminoalkylsilane **ALS** of any one of the preceding claims, characterized in that $Y^1 = Y^2$ = methyl.

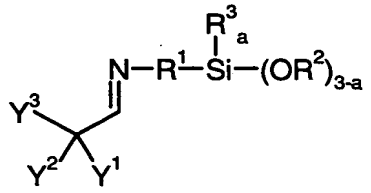
10. The aldiminoalkylsilane **ALS** of claim 7 or 8, characterized in that the aldehyde **ALD** used for preparing the aldiminoalkylsilane **ALS** is obtainable by an esterification reaction of a β-hydroxyaldehyde with a carboxylic acid, in particular without using a solvent, the β-hydroxyaldehyde being prepared, optionally in situ, from formaldehyde, and/or paraformaldehyde, and from a second aldehyde.

11. The aldiminoalkylsilane **ALS** of claim 10, characterized in that the aldehyde **ALD** used for preparing the aldiminoalkylsilane **ALS** is obtainable by an esterification reaction of 3-hydroxypivalaldehyde with a carboxylic acid, in particular without using a solvent, the 3-hydroxypivalaldehyde being prepared, optionally in situ, from formaldehyde, and/or paraformaldehyde, and from isobutyraldehyde.

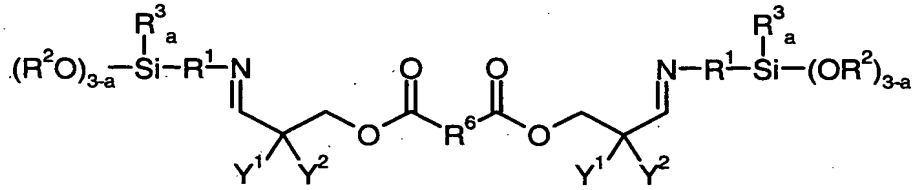
12. The aldiminoalkylsilane **ALS** of either of claims 10 and 11, characterized in that the carboxylic acid used for preparing the aldehyde **ALD** is

selected from the group consisting of lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, succinic acid, adipic acid, azelaic acid and sebacic acid, mixtures thereof and also their technical mixtures with fatty acids.

13. The aldiminoalkylsilane **ALS** of any one of the preceding claims, characterized in that the aldiminoalkylsilane **ALS** has the formula (VII) or (VIII)



(VII)



(VIII)

where

R^6 either

is a linear or branched or cyclic alkylene chain having 2 to 16 carbon atoms, optionally having at least one heteroatom, in particular having at least one ether oxygen;

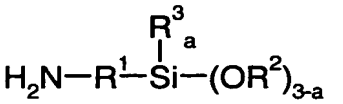
or

is a mono- or polyunsaturated, linear or branched or cyclic hydrocarbon chain having 2 to 16 carbon atoms;

and

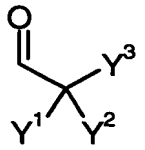
R^7 is a linear or branched alkyl chain having 1 to 8 carbon atoms.

14. A process for preparing an aldiminoalkylsilane **ALS** of any one of claims 1 – 13, comprising reacting an aminoalkylsilane **AS** of the formula (I)



(I)

with at least one aldehyde **ALD** of the formula (II)



(II)

the water formed in the reaction being removed substantially completely from the reaction mixture.

15. The process for preparing an aldiminoalkylsilane **ALS** of claim 14, characterized in that for preparing the aldiminoalkylsilane **ALS** the aldehyde groups of the aldehyde **ALD** are employed stoichiometrically or in a stoichiometric excess in relation to the primary amino groups of the aminoalkylsilane **AS**.

16. The process for preparing an aldiminoalkylsilane **ALS** of claim 14, characterized in that the aminoalkylsilane **AS** is present in a mixture of at least one polyamine having primary aliphatic amino groups and the aldehyde groups of the aldehyde **ALD** are employed stoichiometrically or in a stoichiometric excess relative to the entirety of the primary amino groups, thereby producing, after the reaction, a mixture comprising not only the aldiminoalkylsilane **ALS** but also the polyaldimine formed corresponding to the aldehyde **ALD** used.

17. The use of an aldiminoalkylsilane **ALS** of any one of claims 1 – 13 in compositions which comprise amine-reactive compounds, especially compounds containing isocyanate groups, more preferably aromatic compounds containing isocyanate groups.

18. The use of an aldiminoalkylsilane **ALS** of claim 17, characterized in that the composition is used as an adhesive, sealant, coating or covering.

19. The use of an aldiminoalkylsilane **ALS** of any one of claims 1 – 13 in adhesion promoter compositions.

20. A hydrolysis process characterized in that an aldiminoalkylsilane **ALS** of any one of claims 1 – 13 is contacted with water, in particular in the gaseous aggregate state, preferably in the form of atmospheric moisture, and an aldehyde **ALD** of the formula (II) is liberated.

21. A hydrolysis process characterized in that an aldiminoalkylsilane **ALS** of any one of claims 1 – 13 is contacted with water in the form of a water-containing component or water-releasing component, and an aldehyde **ALD** of the formula (II) is liberated.

22. A moisture-curing polymer composition comprising
at least one polymer containing isocyanate groups and/or silane groups, and
at least one aldiminoalkylsilane **ALS** of any one of claims 1 – 13.

23. The moisture-curing polymer composition of claim 22, characterized in that the polymer containing isocyanate groups and/or silane groups is a polyurethane polymer containing isocyanate groups and prepared from at least one polyisocyanate and at least one polyol, and the moisture-curing polymer composition is a moisture-curing polyurethane composition.

24. The moisture-curing polymer composition of claim 23, characterized in that the polyisocyanate for preparing the polyurethane polymer is a diisocyanate, selected in particular from the group consisting of MDI, TDI, HDI, IPDI, and mixtures thereof, more preferably MDI and TDI and mixtures thereof.

25. The moisture-curing polymer composition of claim 23, characterized in that the polyol for preparing the polyurethane polymer has an average molecular weight of 1000 to 30 000 g/mol and an average OH functionality of 1.6 to 3 and in particular is a polyoxyalkylene polyol or a polyester polyol.

26. The moisture-curing polymer composition of any one of claims 22 – 25, characterized in that the aldiminoalkylsilane **ALS** is present in an amount of 0.01% – 10% by weight, preferably 0.1% – 5% by weight, in particular 0.25% – 2.5% by weight in the polymer composition.

27. The moisture-curing polymer composition of any one of claims 22 – 26, characterized in that in addition to the aldiminoalkylsilane **ALS** a polyaldimine is present.

28. The moisture-curing polymer composition of any one of claims 22 – 27, characterized in that in the course of the hydrolysis of the polyaldimine an aldehyde **ALD** of the formula (II) is liberated.

29. A method of applying a moisture-curing polymer composition of any one of claims 22 – 28, characterized in that said composition is contacted, during or after the application of the composition to a substrate, with atmospheric moisture or with water in the form of a water-containing component or water-releasing component, and subsequently cures, an aldehyde **ALD** of the formula (II) being liberated which preferably remains substantially completely in the cured polymer composition.

30. The method of claim 29, characterized in that the substrate is composed, at least in the region of application of the moisture-curing polymer composition, of glass, glass ceramic, concrete, natural stone, aluminum or automotive topcoat.

31. An adhesion promoter composition characterized in that it comprises or consists of at least one aldiminoalkylsilane **ALS** of any one of claims 1 – 13, in particular characterized in that it further comprises an aminoalkylsilane **AS** of the formula (I).

32. A method of applying an adhesion promoter composition of claim 31, characterized in that said composition is contacted, during or after the

application to a substrate, especially glass, glass ceramic, concrete, natural stone, aluminum or automotive topcoat, with water or atmospheric moisture, before an adhesive, a sealant, a coating or a covering is applied thereto.